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(54) Electrical connector with terminal tail aligning device

(57) An electrical connector (10) includes an elongated dielectric housing (12) having a front mating face (18) and rear face (20) with a plurality of terminal-receiving passageways (22) extending therebetween. The rear face extends between opposite ends (24) of the housing (12) and is devoid of any substantial projections which might prevent a terminal-insertion tool from being moved into proximity with the rear face. A plurality of terminals (16) are received in the passageways (22). Each terminal includes a forwardly projecting contact portion (36) and a tail portion (38) projecting rearwardly from the housing (12) beyond the rear face (20) thereof. An elongated tail aligning device (14) is mountable on the housing (12) and has a plurality of apertures (52) through which the tail portions of the terminals extend. The tail aligning device (14) has wing portions (54) near opposite ends thereof projecting generally transversely of the rear face (20) of the housing (12) to protect the tail portions (38) of the terminals (16) and to stabilize the connector (10).

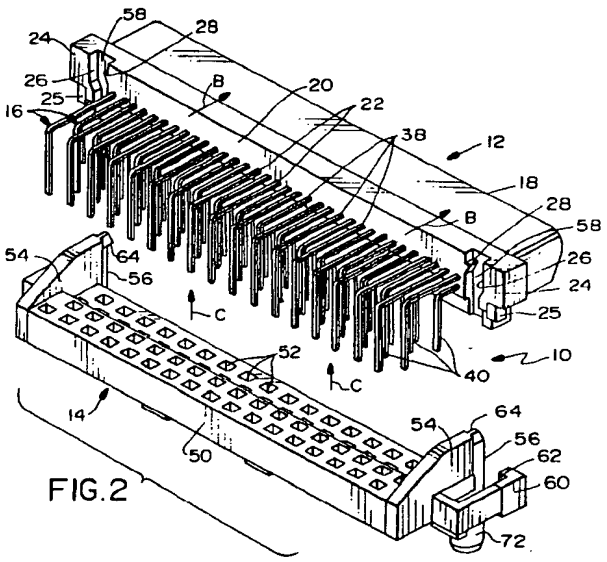

FIG.2

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Description

Field of the Invention

This invention generally relates to the art of electrical connectors and, particularly, to an electrical connector which includes a separate terminal tail aligning device mountable thereon.

Background of the Invention

A known type of input/output (I/O) electrical connector includes an elongated dielectric housing having a front mating face and a rear face with a plurality of terminal-receiving passages extending therebetween. The faces extend between opposite ends of the elongated housing. A plurality of terminals are received in the passages, and each terminal includes a forwardly projecting contact portion and a tail portion projecting rearwardly from the housing beyond the rear face thereof. The housing conventionally includes a pair of generally planar, often triangulated gussets extending rearwardly from the rear face of the housing near the opposite ends thereof and outside the array of terminals. The gussets stabilize the housing and protect the terminals.

The rearwardly projecting gussets on the connector housing create problems during manufacture when the terminals are gang loaded into the passageways in the housing. In particular, these types of connectors are provided in different circuit sizes, and can range from 30 circuits/terminals up to 130 circuits/ terminals, with as many as nine connector sizes within this range. The terminals are gang loaded into the passageways in the housing by blade-like insertion tools which must fit between the end gussets of the housing. Therefore, separate tools must be provided for each connector size because the gussets prevent the tool blade from being moved into proximity with the rear face of the housing if the tool blade is longer than the spacing between the gussets. This problem is compounded when it is understood that these connectors often have two or more rows of differently shaped terminals and, consequently, different sizes or lengths of insertion tools must be provided for each size of connector.

Electrical connectors of the character described above often include terminal tail aligning devices. Specifically, the tail aligning devices are mountable on the connector housings and have a plurality of apertures through which the tail portions of the terminals extend. A tail aligning device typically is provided as a flat plastic member having the tail-receiving apertures therethrough and function to maintain the tail portions of the terminals in proper position and spacing.

The present invention is directed to solving the above problems involved in maintaining large inventories of terminal insertion tools and requiring repeated tool changeovers, by a unique system in which the tail aligning device is provided with the protective gussets normally required for such connectors.

Summary of the Invention

An object, therefore, of the invention is to provide an electrical connector of the character described, with a new and improved tail aligning device.

In the exemplary embodiment of the invention, the electrical connector includes an elongated dielectric housing having a front mating face and a rear face with a plurality of terminal-receiving passageways extending therebetween. The rear face extends between opposite ends of the housing and is devoid of any substantial projections which might prevent a terminal-insertion tool that extends beyond at least one end of the housing from being moved into proximity with the rear face. A plurality of terminals are received in the passageways. Each terminal includes a forwardly projecting contact portion and a tail portion projecting rearwardly from the housing beyond the rear face thereof. An elongated tail aligning device is mountable on the housing and has a plurality of apertures through which the tail portions of the terminals extend. The tail aligning device has wing portions near opposite ends thereof projecting generally transversely of the rear face of the housing to protect the tail portions of the terminals at least near opposite ends of the housing.

The wing portions of the tail aligning device are provided by generally planar gussets which stabilize the connector. The gussets include generally straight edges engageable with generally flat surfaces at the rear face of the housing. Grooves are formed in the rear face of the housing for receiving the straight edges of the gussets. Complementary interengaging holding means are provided between the tail aligning device and the housing for holding the straight edges of the gussets in abutting engagement with the flat surfaces on the housing.

The connector is disclosed herein as a right-angled connector with the tail portions of the terminals including circuit board mounting portions at angles to the contact portions of the terminals. The circuit board mounting portions extend through the apertures in the tail aligning device. The tail aligning device includes at least one mounting post adapted for insertion into a mounting hole in an appropriate circuit board. Preferably, the tail aligning device, including the wing portions thereof and the mounting post, is formed as a one-piece molded dielectric component.

A feature of the invention includes complementary interengaging latch means between the tail aligning device and the housing for mounting the tail aligning device on the housing. The latch means is interengageable automatically as the tail aligning device is moved to its fully operative position with the tail portions of the terminals in proper position in the apertures of the tail aligning device.

Other objects, features and advantages of the invention will be apparent from the following detailed description taken in connection with the accompanying

drawings.

Brief Description of the Drawings

The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with its objects and the advantages thereof, may be best understood by reference to the following description taken in conjunction with the accompanying drawings, in which like reference numerals identify like elements in the figures and in which:

FIGURE 1 is a front perspective view of an electrical connector embodying the concepts of the invention;
FIGURE 2 is an exploded rear perspective view of the housing and tail aligning device of the connector;
FIGURE 3 is a fragmented top plan view of the connector;
FIGURE 4 is an end elevational view looking toward the right-hand end of Figure 1;
FIGURE 5 is a vertical section taken generally along line 5-5 of Figure 1;
FIGURE 6 is a perspective view of the tail aligning device;
FIGURE 7 is a top plan view of the tail aligning device;
FIGURE 8 a bottom plan view of the tail aligning device; and
FIGURE 9 is an elevational view of the side of the tail aligning device which mounts to the connector housing.

Detailed Description of the Preferred Embodiment

Referring to the drawings in greater detail, and first to Figure 1, the invention is embodied in an electrical connector, generally designated 10. As seen best in Figure 2, the connector generally is formed of two basic components, namely an elongated dielectric housing, generally designated 12, and an elongated tail aligning device, generally designated 14, along with a plurality of terminals, generally designated 16. Each of the housing and the tail aligning device is formed as a one-piece molded dielectric component.

More particularly, referring to Figures 3 and 4 in conjunction with Figures 1 and 2, elongated dielectric housing 12 has a front mating face 18 and a rear face 20 with a plurality of terminal-receiving passageways 22 (Figs. 2 and 3) extending therebetween. Front and rear faces 18 and 20, respectively, of the elongated dielectric housing extend generally between opposite ends 24 of the housing. A pair of grooves 26 are formed in rear face 20 near the opposite ends 24 for purposes described hereinafter. A ramped latch boss 28 is provided within each groove 26, again for purposes described hereinafter.

As seen in Figure 5, front mating face 18 of elongated dielectric housing 12 actually is the front face of a generally hollow shroud 30 which receives a complementary mating plug connector (not shown) inserted into the shroud in the direction of arrow "A". An elongated, generally flat tongue 32 projects forwardly within shroud 30. The tongue has a plurality of terminal-receiving grooves 34 on opposite sides thereof.

Still referring to Figure 5 in conjunction with Figures 1-4, each terminal 16 includes a forwardly projecting contact portion 36 and a tail portion 38 projecting rearwardly from housing 12 beyond rear face 20 thereof. Connector 10 is designed as a right-angled electrical connector and, therefore, tail portions 38 of terminals 16 include circuit board mounting portions 40 at right-angles to contact portions 36. The circuit board mounting portions 40 comprise typical solder tails for solder connection to appropriate circuit traces on the circuit board and/or in appropriate holes in the circuit board. Contact portions 36 project into shroud 30 as best seen in Figure 5, with the contact portions being disposed within grooves 34 on opposite of tongue portion 32. When the mating plug connector is inserted into the shroud in the direction of arrow "A" (Fig. 5) complementary contacts on the mating plug connector engage contact portions 36 of terminals 16.

The particular array of terminals 16 of connector 10 herein will not be discussed in detail. Suffice it to say, it can be seen particularly in Figures 2 and 5 that the terminals are of differing configurations and/or lengths so that circuit board mounting portions (or solder tails 40) are in four rows lengthwise of the connector. Referring specifically to Figure 2, the terminals are gang loaded, often one row at a time, into passageways 22 of connector housing 12 in the direction of arrows "B" (Fig. 2). It can be seen in Figure 2 that rear face 20 of connector housing 12 is devoid of any substantial projections which might prevent a terminal-insertion tool that extends beyond either end 24 of the connector from being moved into proximity with the rear face. Therefore, longer tools for longer connectors can be used for shorter connectors without any interference by projections at the rear face of the connector housing.

Referring to Figures 6-9 in conjunction with Figures 1-5, tail aligning device 14 generally includes an elongated plate-like portion 50 having a plurality of apertures 52 through which circuit board mounting portions 40 of terminal tail portions 38 extend. Figures 5 and 6 best illustrate that the plate-like portion 50 has two horizontal levels generally corresponding to the vertical height of each groove 34, respectively. In the exemplary embodiment, two rows of apertures 52 set closer to the connector housing 12 are disposed in the lower level of plate-like portion 50 to support the contact portions 36 of terminals 16 inserted into the lower grooves 34. Two rows of apertures 52 set farthest from the connector housing 12 are disposed in the higher level of the plate-like portion 50 to support the contact portions 36 of terminals 16 inserted into the higher grooves 34. The tail

aligning device has a pair of wing portions 54 near opposite ends thereof projecting generally transversely of the rear face 20 of connector housing 12 to protect the tail portions of the terminals when the tail aligning device is mounted on the housing.

Wing portions 54 of tail aligning device 14 are formed as triangulated, planar gussets which not only protect terminals 16 but also provide stability for the connector including the connector housing. To that end, the gussets have generally straight edges 56 which abut generally straight or flat surfaces 58 (Fig. 2) at the bottoms of grooves 26 in rear face 20 of connector housing 12. Arms 60 at opposite ends of the tail aligning device have hooks 62 such that the arms and hooks embrace opposite ends 24 of the connector housing. These arms and hooks form complementary interengaging holding means for holding straight edges 56 of gussets 54 into abutting engagement with flat surfaces 58 on connector housing 12 such that the gussets not only rigidify tail aligning device 14, but the gussets are effective to stabilize the entire connector through the rigid abutting engagement between edges 56 and surfaces 58.

Generally, complementary interengaging snap-latch means are provided between tail aligning device 14 and housing 12 for mounting the tail aligning device on the housing automatically as the tail aligning device is moved to its fully operative mounted position. More particularly, as best seen in Figures 6 and 9, the tail aligning device includes a pair of ramped latches 64 facing inwardly of gussets 54 near straight edges 56 of the gussets. Tail aligning device 14 is mountable to connector housing 12 in the direction of arrows "C" (Fig. 2). As the tail aligning device is moved in its mounting direction, circuit board mounting portions 40 of terminal tail portions 38 enter apertures 52 in the tail aligning device. As the tail aligning device is moved to its fully mounted/operative position, the ramped surfaces on latches 64 engage the ramped surface on latch bosses 28 within grooves 26 at the rear face 20 of the connector housing and, eventually, the latches and latch bosses snap into latching engagement automatically due to the inherent resiliency of the molded dielectric components. In the fully mounted position, the top edges of arms 60 at the ends of the tail aligning device rigidly abut against the bottom surfaces of ends 24 of connector housing 12 to form a rigid mounting interface (as at 70 in Fig. 1).

Lastly, a pair of mounting posts 72 are molded integrally with the bottom of tail aligning device 14. These posts are adapted for insertion into mounting holes in an appropriate circuit board to which circuit board mounting portions 40 of the terminals are connected.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or central characteristics thereof. The present examples and embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein.

Claims

1. An electrical connector (10), comprising:

   an elongated dielectric housing (12) having a front mating face (18) and a rear face (20) with a plurality of terminal-receiving passageways (22) extending therebetween; a plurality of terminals (16) received in the passageways (22), each terminal including a forwardly projecting contact portion (36) and a tail portion (38) projecting rearwardly from the housing (12) beyond said rear face (20) thereof; and an elongated tail aligning device (14) mountable on the housing and having a plurality of apertures (52) through which the tail portions of the terminals extend, the tail aligning device having wing portions (54) near opposite ends thereof projecting generally transversely of the rear face (20) of the housing to protect the tail portions (38) of the terminals (16); characterized in that:

   said elongated tail aligning device (14) and said housing (12) include a latch (64) and a latch boss (28), said latch (64) for interengaging said latch boss (28) forwardly of said rear face (20) to latch said tail aligning device (14) to said housing (12), and said rear face (20) of said housing (12) extends between opposite ends (24) of the housing (12) and is devoid of any substantial projections which might prevent a terminal-insertion tool that extends beyond at least one end (24) of the housing (12) from being moved into proximity with the rear face (20).

2. The electrical connector of claim 1 characterized in that said wing portions of the tail aligning device comprise generally planar gussets (54) for stabilizing the connector.

3. The electrical connector of claim 2 characterized in that said tail aligning device (14) includes generally straight edges (56) engageable with generally flat surfaces (58) at the rear face (20) of the housing (12).

4. The electrical connector of claim 3 characterized in that said housing (12) includes grooves (26) in the rear face (20) thereof for receiving the straight edges (56) of the gussets (54) on the tail aligning device (14).

5. The electrical connector of claim 4 characterized in that said straight edges (56) include said latches (64) for interengaging said latch bosses (28) disposed in said grooves (26).

6. The electrical connector of claim 3, 4 or 5, charac-

terized in that said electrical connector includes complementary interengaging holding means (60, 62, 24) between the tail aligning device (14) and the housing (12) for holding the straight edges (56) in engagement with the flat surfaces (58) at the rear face (20) of the housing (12).

7. The electrical connector of claim 1, 2, 3, 4, 5 or 6 characterized in that said electrical connector (10) is a right-angled connector with the tail portions (38) of the terminals (16) including circuit board mounting portions (40) at angles to said contact portions (36), the circuit board mounting portions extending through the apertures (52) in the tail aligning device (14).

8. The electrical connector of claim 7 characterized in that said tail aligning device (14), including said wing portions (54) thereof and a mounting post (72) comprise a one-piece molded dielectric component.

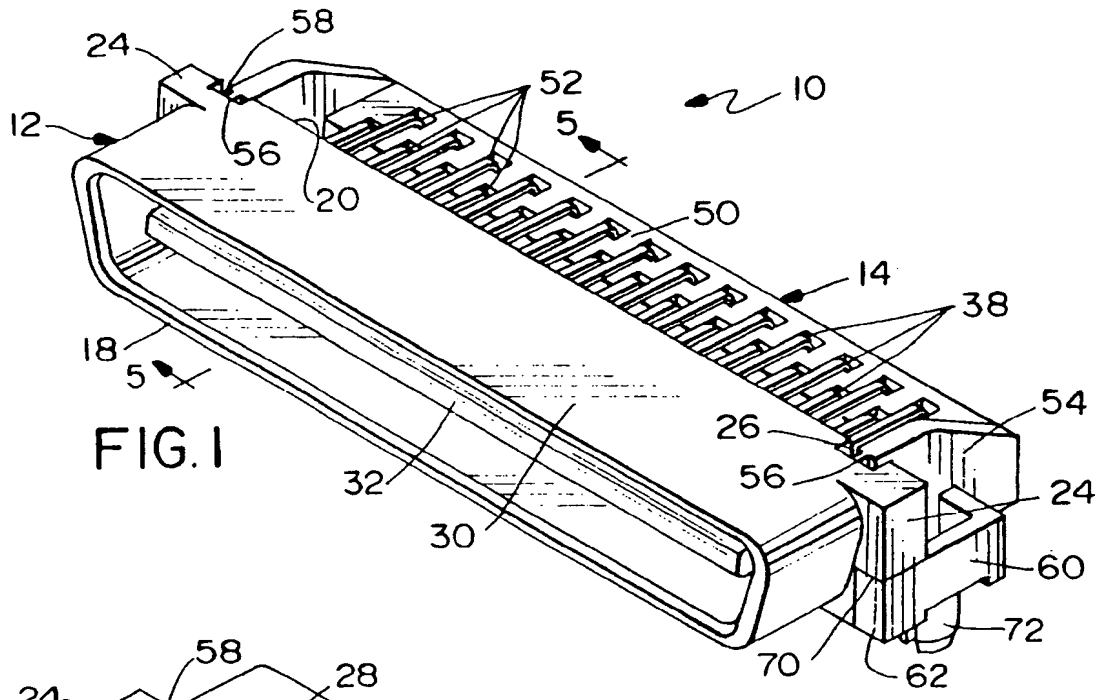

FIG.1

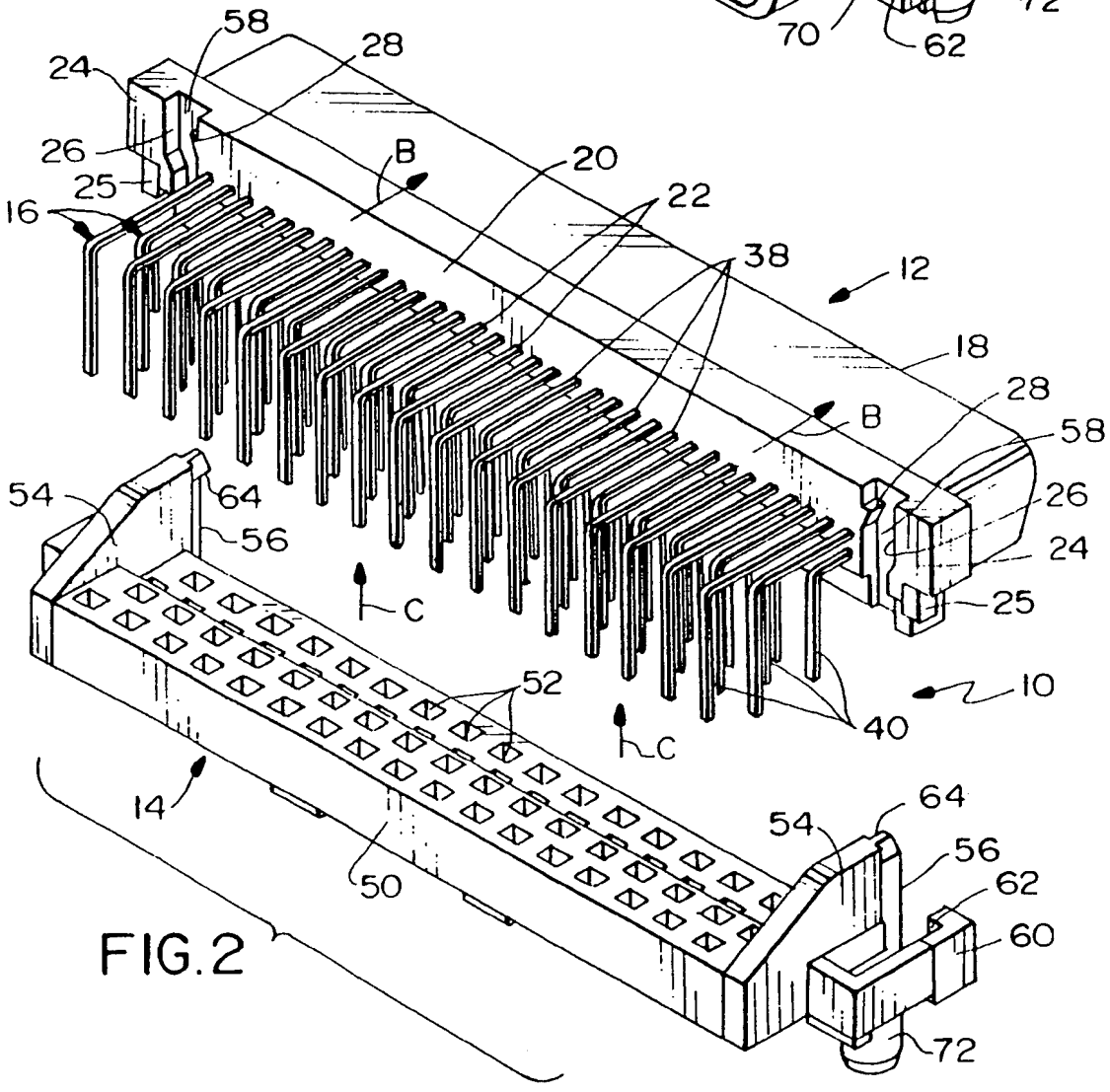

FIG.2

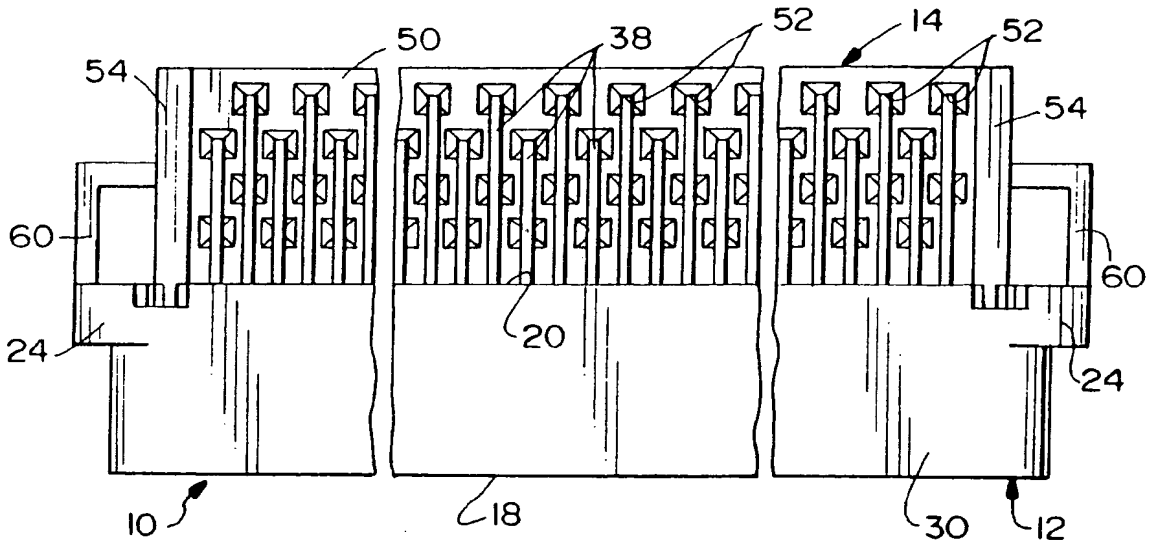

FIG.3

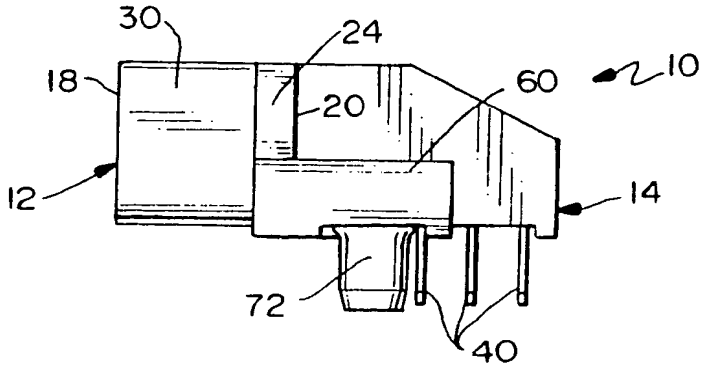

FIG.4

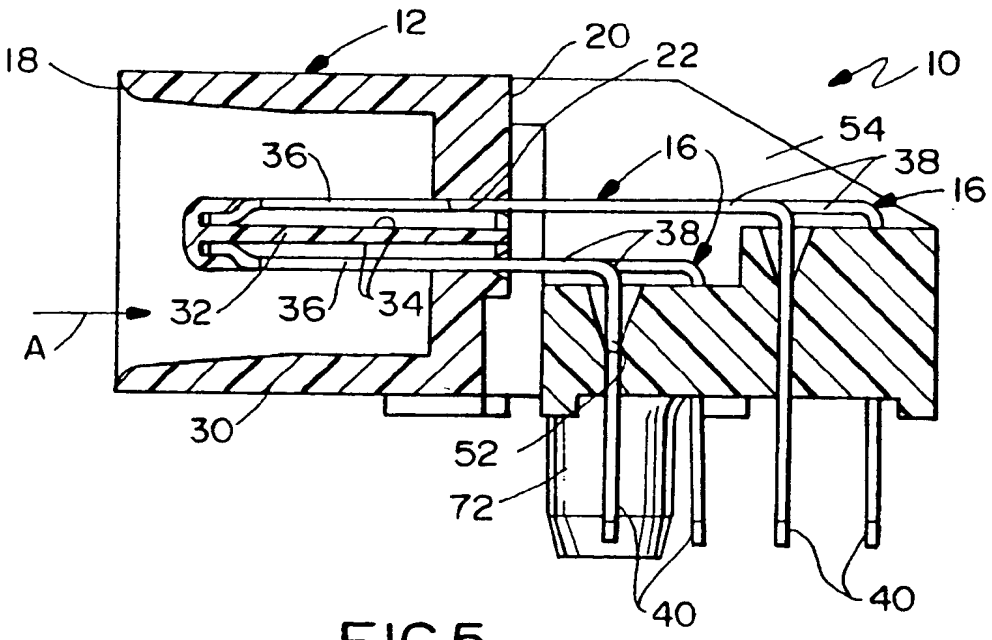

FIG.5

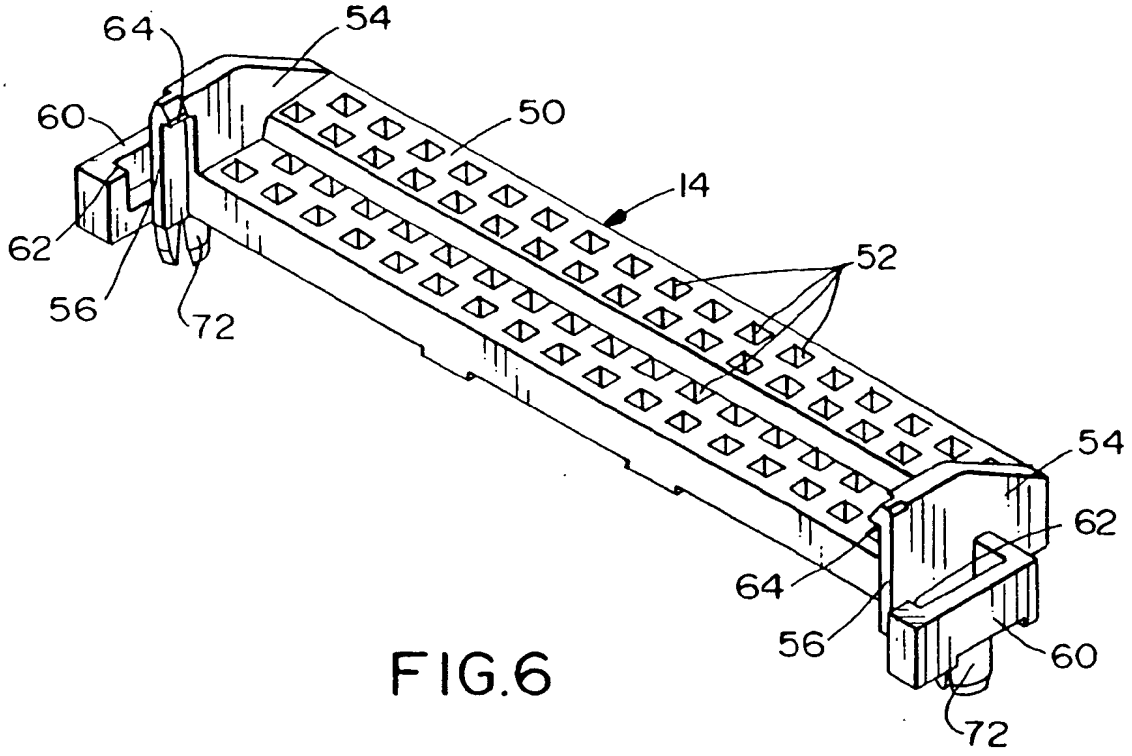

FIG.6

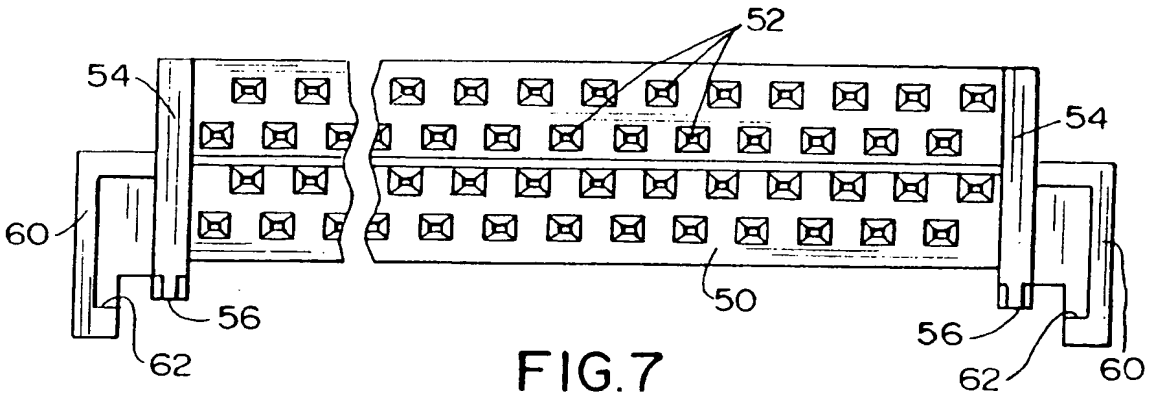

FIG.7

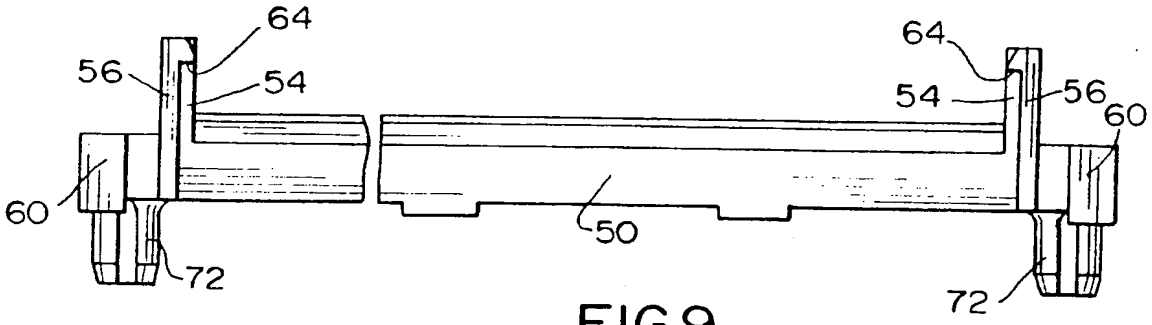

FIG.9

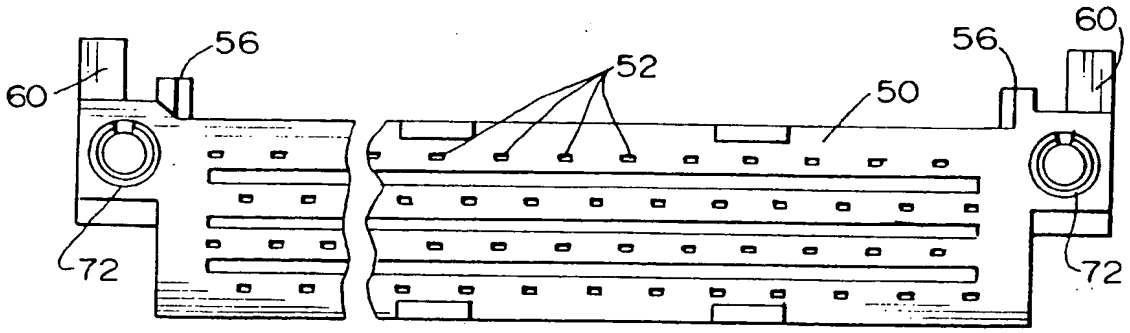

FIG.8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 10 8902

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB-A-2 095 485 (ITT) * page 1, line 41 - line 62 * * page 1, line 118 - line 125 * * page 2, line 11 - line 35; figures 2,3 *	1,7	H01R23/70
A	EP-A-0 639 873 (SUMITOMO) * column 1, line 23 - line 38; figures 5,6 *	1,3-5,7	
A	EP-A-0 335 160 (HARTING) * column 3, line 57 - column 4, line 2; figure 2 *	1,7	
A	EP-A-0 635 912 (MOLEX) * column 4, line 41 - line 49; figure 2 *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	20 September 1996	Alexatos, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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